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PHOTOGRAPHIC INTERPRETATION REPORT

HEN EGG TRACKING FACILITIES 6, 10, AND 3
SARY-SHAGAN ANTIMISSILE TEST CENTER
USSR

JUNE 1968
COPY 113
25 PAGES

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MEMORANDUM FOR: Holders of NPIC Documents Listed Below

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Report Title

- a. Hen Egg Tracking Facilities
6, 10, and 3, Sary-Shagan
Antimissile Test Center, USSR
- b. GALOSH Missile Components and
Shipping Crates Seen at the
GALOSH Missile Assembly
Facility, SSATC
- c. Revised Mensural Data on
GALOSH Missile

TCS

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MEMORANDUM FOR: Holders of NPIC Documents Listed Below
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PIR (HEN EGG Sites, 6, 10 & 3)

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NPIC/R-170/66
(GALOSH Mensural Data)

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PHOTOGRAPHIC INTERPRETATION REPORT

HEN EGG TRACKING FACILITIES 6, 10, AND 3, SARY-SHAGAN ANTIMISSILE TEST CENTER, USSR

JUNE 1968

NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

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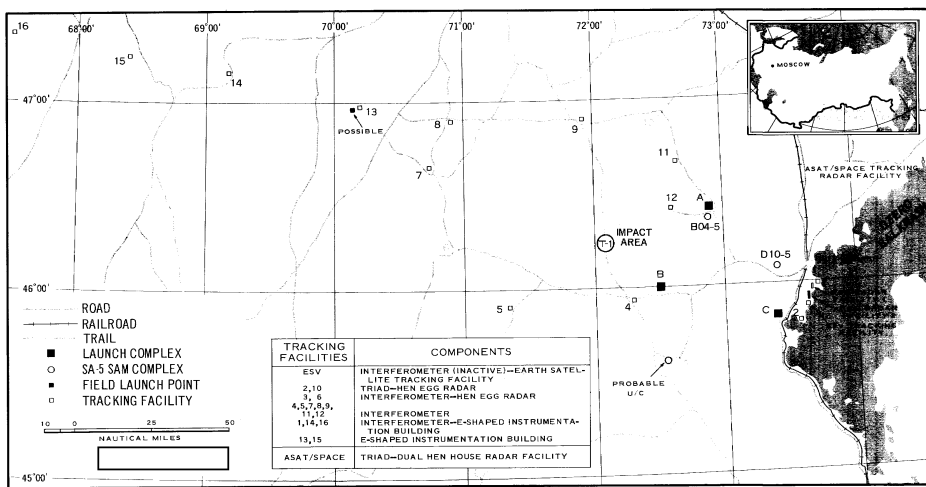


FIGURE 1. TRACKING FACILITIES 6, 10, AND 3, SARY-SHAGAN ANTIMISSILE TEST CENTER (SSATC), USSR.

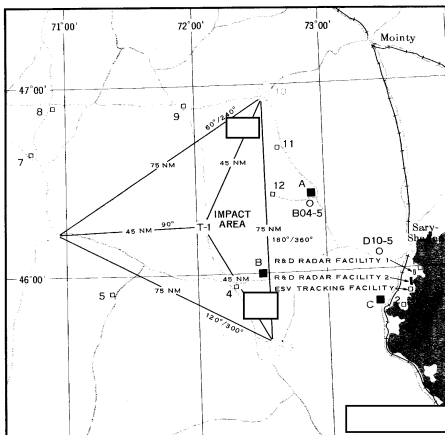


FIGURE 2. DISTANCES AND AZIMUTHAL RELATIONSHIPS BETWEEN HEN EGG TRACKING FACILITIES, SSATC.

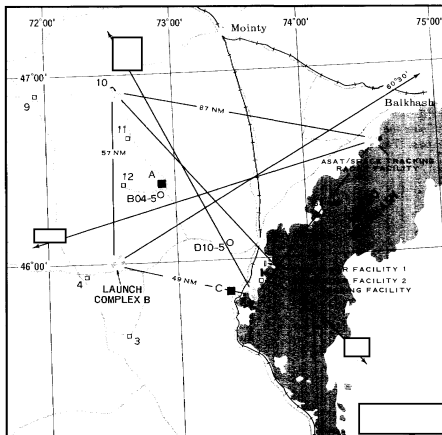


FIGURE 3. DISTANCES AND AZIMUTHAL RELATIONSHIPS BETWEEN TRIAD FACILITIES, SSATC.

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SUMMARY/CONCLUSIONS

Tracking Facilities 6, 10, and 3 form an equilateral triangle around the T-1 or Kapustin Yar 1,050-nautical-mile impact area. They are 75 nm apart and 45 nm from the center of the T-1 impact area. The facilities are composed along generally similar lines, although there are significant differences. Each consists of an operations area containing a HEN EGG Radome, a support area, and associated facilities including a microwave/calibration facility and an airstrip. Among significant variations, Tracking Facility 6 has a Bi-Axis Radome, the only one of its kind to be identified in the USSR, and contains the only completed interferometer among the three facilities. Tracking Facility 10 has a TRIAD, one of four originally constructed at Sary-Shagan and one of three which were never completed. The HEN EGG radar system featured at these facilities is similar to the TRIAD radar system deployed at Sary-Shagan and Moscow and may have been its prototype. A new probable SA-5 launch complex with three sites is observed in the initial construction stages just west of Tracking Facility 3.

INTRODUCTION

The first photographic coverage of the Sary-Shagan Antimissile Test Center (SSATC) on [redacted] revealed the existence of the three HEN EGG tracking facilities 6, 10, and 3 (Figure 1) in various stages of construction.

In the fall of 1961 and of 1962, the Soviets conducted precise, multiple-missile nuclear tests near SSATC. It is probable that the HEN EGG radar facilities played a large role in the collection of data from these tests.

The three HEN EGG radars and their associated 50-foot-diameter domes are positioned in a similar manner in relation to the T-1 impact area. The large HEN EGG radar is positioned on that side of the control building away from the impact area and the 50-foot dome on that side of the control building closer to the impact area. An azimuth passing through the center of the HEN EGG radar and the center of the 50-foot dome passes through the T-1 impact area in each case (Figure 2).

The four TRIADS at SSATC, one of which is at Tracking Facility 10, are arranged in a pattern which suggests that testing was originally intended to utilize HEN EGG-type radar dishes mounted atop all four large TRIAD buildings, instead of just the one at Launch Complex B. Like the HEN EGG facilities, the small radomes/buildings of the TRIADS are always closer to the impact area than the large radomes/buildings (Figure 3).

Five probable optical tracking devices are observed at the three HEN EGG facilities. An additional 37 of these devices are located at the seven other tracking facilities which ring the T-1 impact area. These small-domed structures have been previously reported as Radar As at various Soviet missile test centers. No equipment has been identified when observed with the domes removed. Figure 4 is a ground photo of a Soviet cinetheodolite, which may be the type of equipment mounted under the domes.

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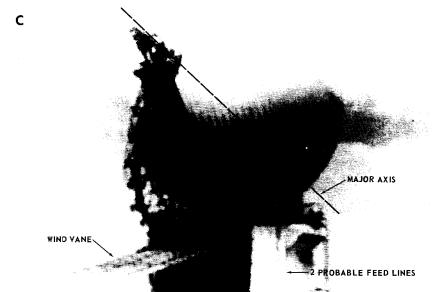
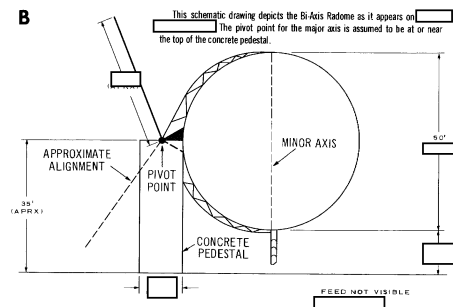
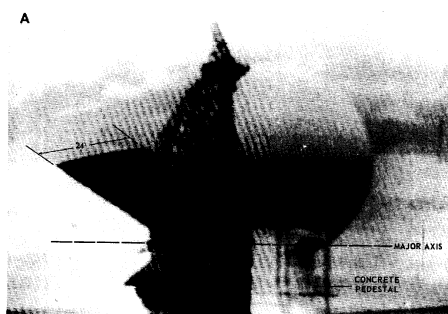


FIGURE 5. BI-AXIS RADOME, TRACKING FACILITY 6. This unique radar was photographed as it was rotating around its major axis in the Soviet TV movie "Rockets Guard the Peace" (May 65). Four probable feedlines are clearly observed attached to one of the concrete pedestals and also where they enter the radome along the minor axis. Two wind vanes are attached to and rotate with the major axis. All mensuration shown on the photos was derived from satellite

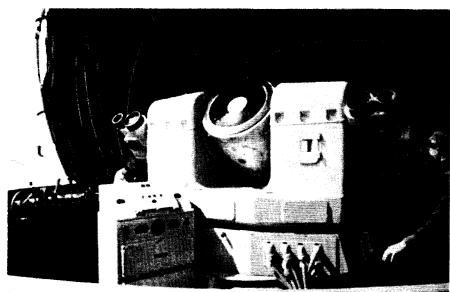


FIGURE 4. SOVIET CINETHEODOLITE. This may be the type of equipment employed on the probable optical tracking devices at SSATC. The size of the equipment indicates it would be compatible with the space available under the environmental domes.

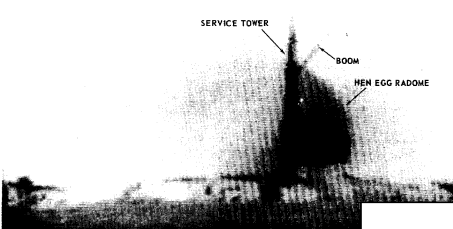
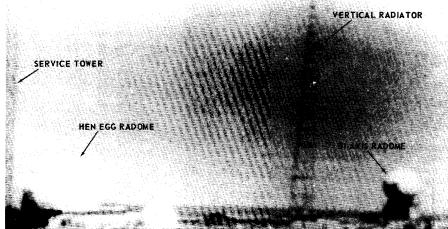


FIGURE 6. GROUND PHOTOGRAPHY OF THE OPERATIONS AREA AT TRACKING FACILITY 6. From the Soviet TV movie "Rockets Guard the Peace"

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TRACKING FACILITY 6 (46-14-00N 70-54-29E)

Tracking Facility 6 (Figures 5-11) is the westernmost of the three HEN EGG Radar Facilities. It is 115 nautical miles (nm) west of the Main Support Base (on Lake Balkhash) and 65 nm west of Launch Complex B. An all-weather road connects the facility with the Main Support Base. The facility consists of an operations area and supporting facilities. Associated facilities include an interferometer, a microwave/calibration facility, and two natural-surface airstrips.

Operations Area

The operations area (Figures 8 and 9) contains the HEN EGG Radome with its adjacent control building and 50-foot radome; the Bi-Axis Radome, with adjacent control building; a vertical radiator; and two probable optical tracking devices.

In [REDACTED] the HEN EGG Radome was the only component of the facility visible through heavy clouds. The [REDACTED] diameter radome has remained present since that time, whereas those at Tracking Facilities 3 and 10 have been removed. A circular base structure, apparently identical to those observed at Tracking Facilities 3 and 10, supports the radome. A permanent service tower with a swinging boom is beside the radome. The associated 50-foot radome could first be observed in [REDACTED]

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The Bi-Axis, or Odd Ball, Radome could be observed for the first time in [REDACTED]. This unique 50-foot dome is the only one of its type ever observed in the USSR (see Figure 5). Capable of rotating on two axes, it is mounted on a pass-through structure with two paddle-like wind vanes rotating with one axis. At least four probable feedlines* can be seen attached to the dome, which suggests that the antenna inside the dome may be a multi-antenna array, rather than just one antenna. A large control building, identical in size to the HEN EGG control buildings, is adjacent to it. Its relationship to the HEN EGG radar system is unknown, as is the case with the 50-foot dome opposite each HEN EGG radar.

Two probable optical tracking devices, first observed in 1960, are present in the operations area. Each has an [REDACTED] diameter dome mounted on [REDACTED] circular pedestals. These domes have never been observed removed at Tracking Facility 6.

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A vertical radiator in the operations area was first identified in [REDACTED]. This 375-foot tower has a triangular base formed by three concrete supports spaced 35 feet apart.

Additional facilities in the operations area include an earthen mound with a small structure on it and 13 other miscellaneous buildings and structures.

The only significant change in the operations area since 1960-61 has been the removal of three buildings in 1966.

*These feedlines are observed on the photography from the Soviet TV movie "Rockets Guard the Peace." Photos from the movie of Tracking Facility 6 are included as Figure 6.

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Support Area

The support area (Figures 8 and 9) appeared complete in 1960, containing a total of 100 buildings and structures. No power sub-station is present and electric power may be generated on site. A low-voltage powerline/landline connects the facility with Tracking Facilities 5 and 7. Additional facilities present in the support area include two large coolings ponds and a vehicle maintenance area. The only significant change observed since 1960 has been the removal of 15 one-story barracks between [REDACTED]

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Microwave/Calibration Facility (Figure 10)

This facility was identified in [REDACTED]. It contains a large tower [REDACTED] and several support buildings. At least four antennas are mounted on the tower. Two probable microwave antennas face east and one probable microwave antenna faces west. An antenna which is probably being used for HEN EGG calibration purposes is mounted near the top of the tower. Antenna dimensions and shapes cannot be determined, but their heights on the tower are shown in Figure 10.

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Interferometer (Figure 11)

Earth-grading for the interferometer plane was first observed in [REDACTED]. earth grading for the arms, however, was not observed until [REDACTED] the 1,000-foot arms were complete. Antennas could be identified on the arms in the first large-scale coverage of Tracking Facility 6 in [REDACTED]. Antenna spacings of 25, 80, and 295 feet from center (RP) on all four arms compare favorably with the antenna spacings observed for other active interferometers at SSATC.

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Airstrips (Figure 7)

Two natural-surface airstrips support Tracking Facility 6, one active and the other apparently not in use. The closer one to the facility appears to be active. It has three small support buildings, the largest [REDACTED]. Only one aircraft (Colt) has ever been observed at the airstrip.

Unidentified Activity West of the Support Area (Figure 7)

Facilities other than those now present at Tracking Facility 6 existed prior to the first photo coverage of 1960 and were torn down prior to 1960. Fifteen medium to small building foundations, 57 small tent bases, and one earth-banked building are just west of the support area. They may have supported the tracking facility prior to construction of permanent support facilities or could have been the construction support facility.

Just to the south of the support area is an area of unidentified random scarring that may have been a part of this earlier activity. Two drive-in earthen dugouts, possibly for mobile electronics equipment, are connected by a series of 31 small earth scars to the microwave/calibration facility.

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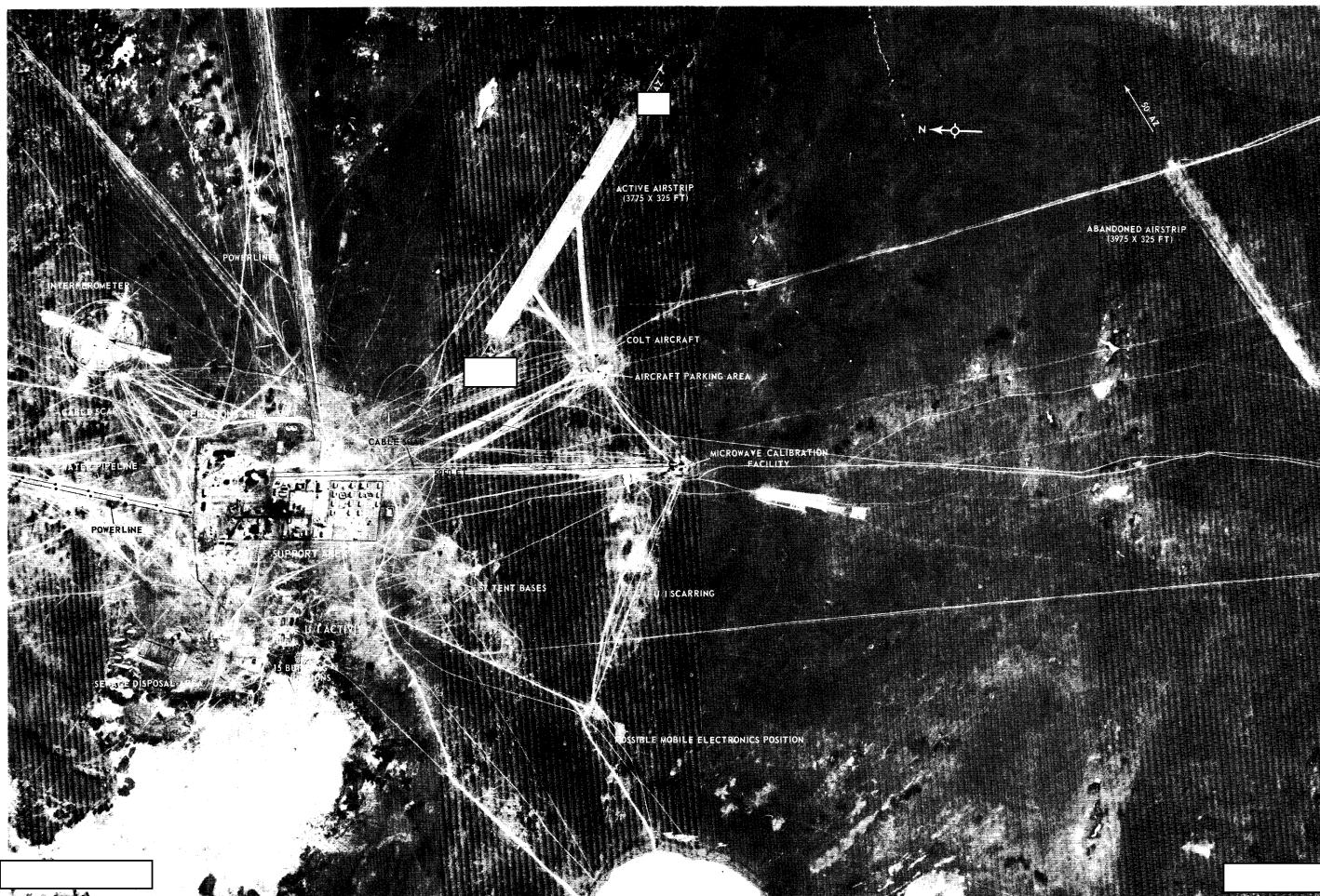


FIGURE 7. TRACKING FACILITY 6, SSATC.

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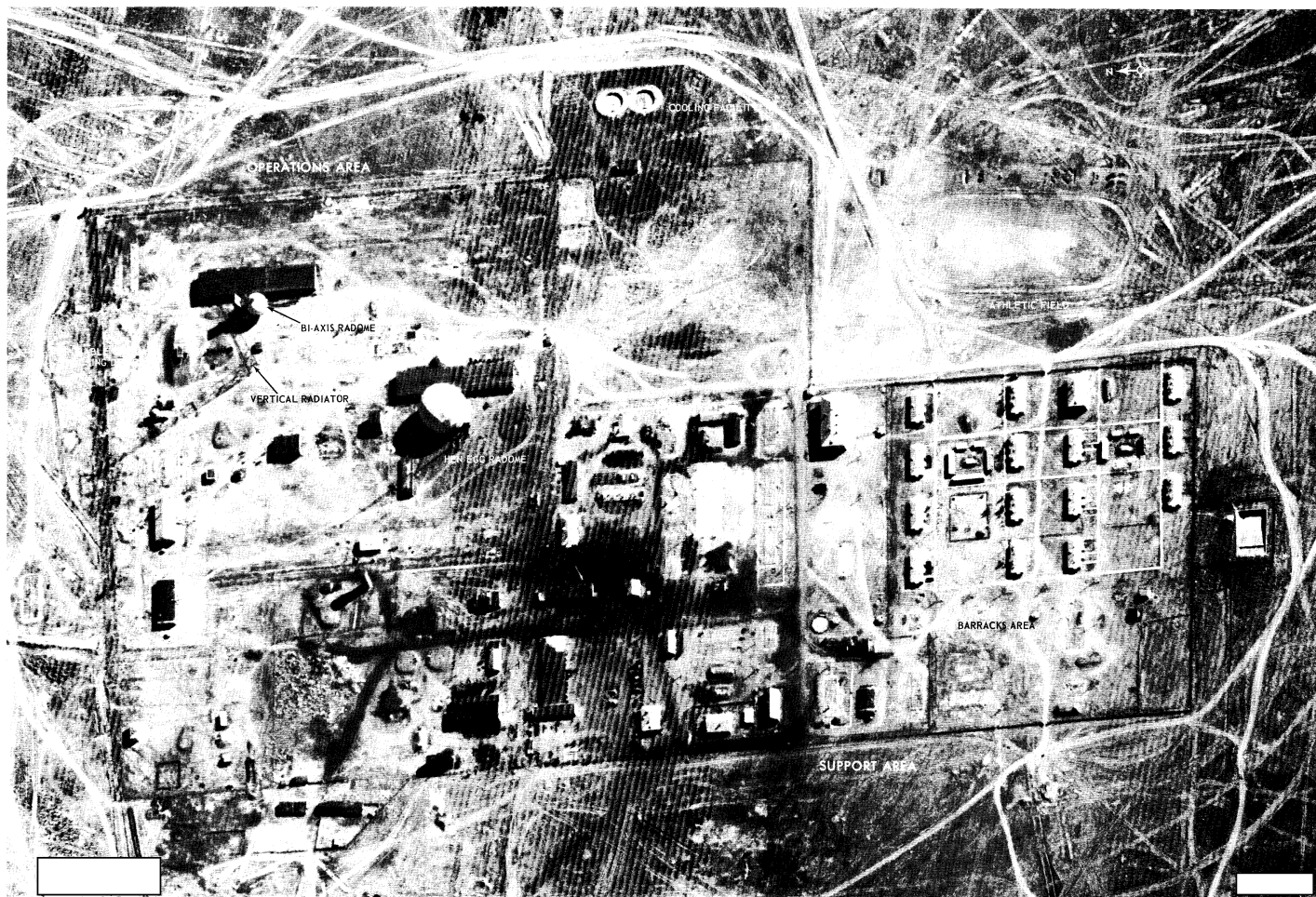


FIGURE 8. OPERATIONS AND SUPPORT AREAS, TRACKING FACILITY 6.

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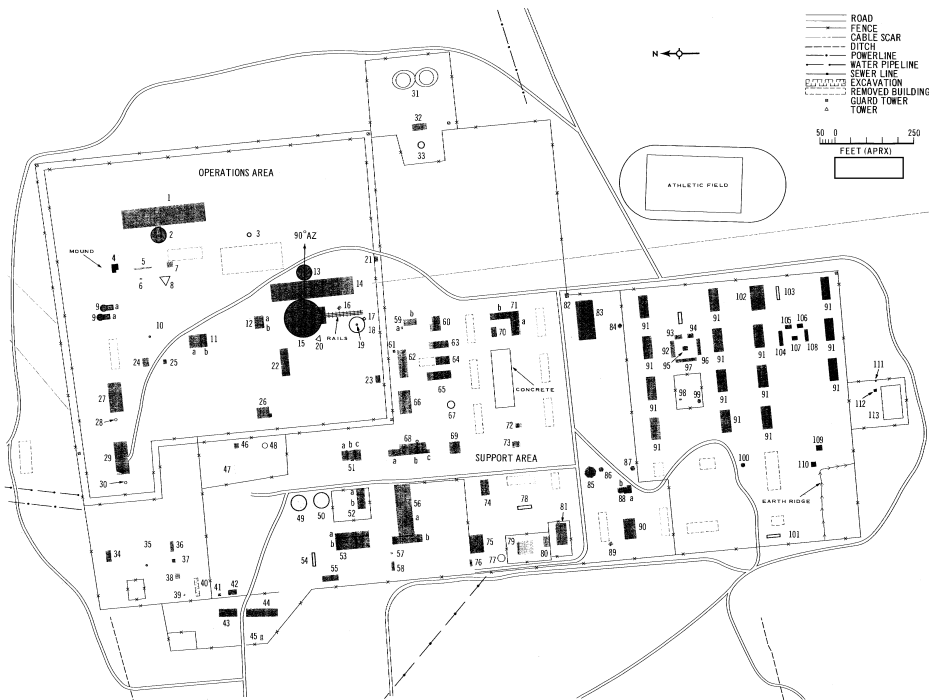


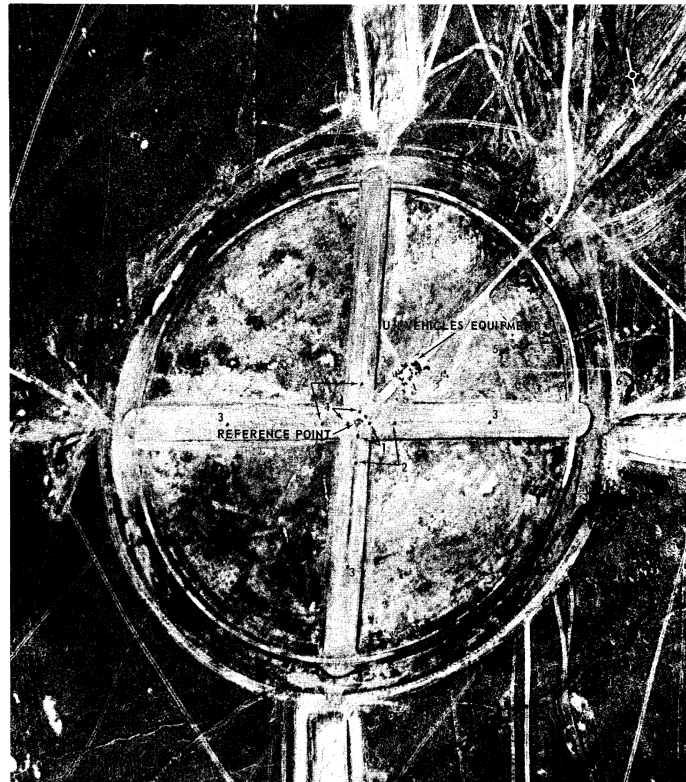
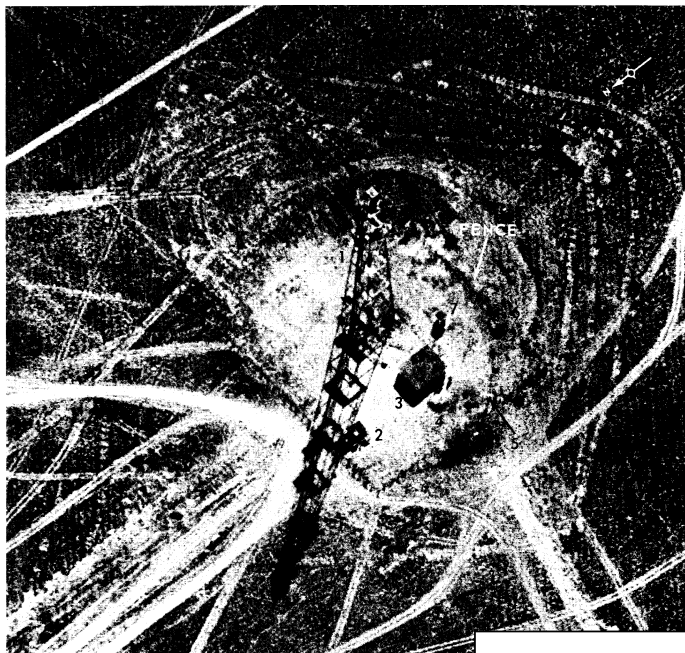
FIGURE 9. LAYOUT OF OPERATIONS AND SUPPORT AREAS, TRACKING FACILITY 6.

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Table 1. Tracking Facility 6, Sary-Shagan Antisatellite Test Center (Items keyed to Figure 9)

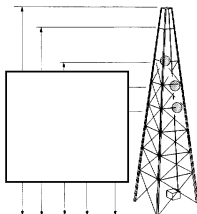
Item	Description	Dimensions (ft)	Height (ft)	Item	Description	Dimensions (ft)	Height (ft)
1	Bi-axis remote control bldg			56a	Vehicle maintenance bldg		
2	Bi-axis radome			b	Vehicle maintenance bldg		
3	Prob earth-covered tank			57	Bldg		
4	Bldg			58	Bldg		
5	U/I structure			59a	Bldg		
6	U/I structure			b	Bldg		
7	Bldg			60	Bldg		
8	Vertical radiator			61	Bldg		
9	Prob optical tracking device (2)			62	Bldg		
a	Prob optical tracking structure (2)			63	Bldg		
10	Poss earth-covered tank			64	Bldg		
11a	Bldg			65	Earth-based bldg		
b	Bldg			66	Bldg		
12a	Bldg			67	Prob earth-covered tank		
b	Bldg			68a	Shrapnel		
13	Radome			b	Shrapnel		
14	HEN EGG radar control bldg			c	Shrapnel		
15	HEN EGG radome			69	Bldg		
16	Bldg			70	Bldg		
17	U/I tower or mast			71a	Bldg		
18	Poss earth-covered tank			b	Bldg		
19	U/I structure			72	Bldg		
20	Service tower w/room			73	Bldg		
21	Security bridge			74	Bldg		
22	Bldg			75	Bldg		
23	Bldg			76	Bldg		
24	Bldg			77	Tank		
25	Bldg			78	Earth-covered structure		
26	Bldg			79	Bldg		
27	Bldg			80	Bldg		
28	U/I structure			81	Bldg		
29	Bldg			82	Bldg		
30	U/I structure			83	Prob admin bldg		
31	Cooling ponds (2)			84	U/I six-sided structure		
32	Pumphouse			85	U/I eight-sided structure		
33	Earth-covered tank			86,87	U/I six-sided structure		
34	Bldg			88a	Bldg/pantheon for outdoor theater		
35	Poss earth-covered tank			b	Bldg/pantheon for outdoor theater		
36	Bldg			89	Bldg		
37	Earth-banked structure			90	Bldg		
38	Bldg			91	Bldg (14)		
39	Bldg			92	Bldg		
40	Excavation			93	Bldg		
41	Bldg			94	Bldg		
42	Bldg			95	Bldg		
43	Bldg			96	Bldg		
44	Bldg			97	Bldg		
45	Bldg			98	Bldg		
46	Pumphouse			99	U/I six-sided structure		
47	Earth-covered prob water storage tank			100	U/I six-sided structure		
48	Water standpipe			101	Earth-covered structure		
49,50	Prob earth-covered tank			102	Prob admin bldg		
51a	Bldg			103	Earth-covered structure		
b	Bldg			104	Bldg		
c	Bldg			105	Bldg		
52a	Bldg			106	Bldg		
b	Bldg			107	Bldg		
53a	Bldg			108	Bldg		
b	Bldg			109	Bldg		
54	Earth-covered structure			110	Bldg		
55	Bldg			111	Bldg		
				112	Bldg		
				113	Swimming pool		

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ITEM	DESCRIPTION
1	MICROWAVE/CALIBRATION TOWER
2	SECURITY BLDG
3	CONTROL BLDG
4	EARTH-COVERED TANK
5	U/I TOWER
6	BLDG
7	U/I STRUCTURE

DIMENSIONS
(FT)



ANTENNA LOCATION	DISTANCE (FT)	ITEM	DESCRIPTION	DIMENSIONS (FT)
REF POINT TO 1	25	1	ANTENNA	
1 TO 2	55	2	ANTENNA	
2 TO 3	215	3	ANTENNA	
		4	POSS U/G STRUCTURE OR HARDSTAND	
		5	U/G BUNKER	
		6	TOWER	
		7	SECURITY BLDG	

FIGURE 10. MICROWAVE/CALIBRATION FACILITY, TRACKING FACILITY 6.

FIGURE 11. INTERFEROMETER, TRACKING FACILITY 6.

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TRACKING FACILITY 10 (46-56-56N 72-31-08E)

This facility (Figures 12-18) is the northernmost of the three HEN EGG Radar Facilities. It is approximately 70 nm northwest of the Main Support Base. It consists of an operations area, a support area, and associated facilities including a microwave/calibration tower, an airstrip, and an inactive, partially completed TRIAD. Major components of the facility are separated by security fences. The area is served by an unsurfaced road. Indications of construction or employment of an interferometer at Tracking Facility 10 have not been evident.

Operations Area

The operations area (Figures 13 and 14) contains the HEN EGG Radar with its associated 50-foot radome and two large control buildings along with four smaller buildings. The HEN EGG Radar (Figure 15) consists of a [REDACTED] parabolic dish mounted atop a pedestal, set inside a 105-foot circular base structure. The dish appears to be identical to the one observed at Tracking Facility 3. When first observed on photography of [REDACTED] there was no evidence of the large radome which later appeared in place on the circular base structure. It was observed in position during the period [REDACTED] On photography of [REDACTED] the radome had been removed and has not been in evidence since. Each time the [REDACTED] dish has been observed on large-scale photography it has been in the same position: slightly elevated looking west.

Three probable tracks extend from the radar pedestal along the western half of the control building. The function of these tracks is undetermined. The pedestal has been observed in only one position and does not appear to be designed to move. A [REDACTED] service tower stands adjacent to the circular base structure.

Near the western end of the control building and adjacent to the probable tracks is a circular area (resembling a buried tank) with an unidentified structure at its center. A 30-foot tower stands adjacent to the circle's outer edge. A probable optical tracking structure (formerly called Radar A) is located just south of the smaller control building. It was first discernible on photography of [REDACTED] On large-scale photography of [REDACTED] the structure was observed to be domed. By [REDACTED] however, the dome had been removed and has not been in evidence since. No equipment has been observed on the structure. A cooling facility is 700 feet northwest of the HEN EGG Radar in a separately fence-enclosed area.

The most recent activity observed within the operations area of Tracking Facility 10 was new roofing on the large control building adjacent to the HEN EGG Radar in [REDACTED]

Support Area

The support area (Figures 13 and 14) contains a total of 53 buildings. Components of the support area include a steamplant, a power substation, a water tower, at least ten barracks, and several auxiliary buildings. The substation is the terminus of two 110-kilovolt powerlines, which lead from a substation at Launch Complex A.

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Three of the buildings in the support area are earth banked. A fourth earth-banked building has been dismantled. The function of this group of buildings is undetermined, although the earth bunkering may be to facilitate temperature control. One of the buildings is extensively vented, while the other two appear to be unvented.

The only significant change within the support area since the date of first observation [REDACTED] has been the removal of several of the smaller buildings.

TRIAD

Tracking Facility 10 contains one of four TRIADS originally constructed at SSATC. However, this TRIAD was one of the three TRIADS never completed. The one completed TRIAD is at Launch Complex B and the other two are at Tracking Facility 2 and at the Antisatellite/Space Tracking Radar Facility.

The partially completed TRIAD facility (Figures 17 and 18) consists of three large buildings and four medium-sized associated buildings located within a fenced enclosure approximately 2,065 feet southeast of the HEN EGG Radar. The sizes of the three control buildings (designated A, B, and C) and their positioning relative to each other is identical to the TRIADS observed at Tracking Facility 2, at Launch Complex B, and at the ASAT/Space Tracking Radar Facility (formerly Instrumentation Site 13). Antenna positions atop the three buildings form an equilateral triangle with 650-foot sides. A pedestal with a two-sectional arrangement is present on the roof of TRIAD Building A. A smaller pedestal is present on the roof of TRIAD Building B. These pedestals, which appear incomplete, probably were designed to house components of the radar mechanism and to provide access to the lower part of the control buildings, as well as to support the large dish antennas.

Associated facilities at the TRIAD include a steamplant, a probable temperature/humidity control plant, and a cooling facility consisting of two tanks and a pumping station.

The TRIAD was first observed, in an early stage of construction, on photography of [REDACTED]. Construction progressed to its present stage probably by early 1963. No evidence of construction or other activity has been observed since [REDACTED]. Ditching in the area remains unbackfilled, and one of the two cooling tanks has not been backfilled.

Microwave/Calibration Facility

[REDACTED] microwave/calibration tower (Figure 16) is located 6,385 feet northwest of the HEN EGG Radar in a fence-enclosed area. It was first observed in [REDACTED]. Two probable horn reflectors are positioned on the tower [REDACTED] above the ground. A control building and five additional buildings are within the fenced area. One of these buildings first appeared under construction on photography of [REDACTED]. A large ditch was dug from the east end of this building to a point just outside the security fence. It is now backfilled and forms a large ridge. A second building has been enlarged since [REDACTED].

Airstrip

A natural-surface airstrip supports Tracking Facility 10. No aircraft have been observed at the airstrip on available coverage.

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TRACKING FACILITY 3 (45-37-37N 72-35-56E)

Tracking Facility 3 (Figures 19-25) is the southernmost of the three HEN EGG Radar facilities. It is approximately 55 nm southwest of the Main Support Base and 25 nm south-southeast of Launch Complex B. It consists of an operations area and a support area. Associated facilities include a microwave/calibration facility, a natural surface airstrip, and an incomplete interferometer. An all-weather road connects the facility with the Main Support Base.

Operations Area

The HEN EGG Radar consists of a large parabolic dish approximately [REDACTED] in diameter. It is mounted on a pedestal set inside a 105-foot circular base structure with three arms supporting a secondary reflector approximately [REDACTED] in diameter (Figures 22 and 23). A 115-foot radome was observed in place on the circular base during the period [REDACTED]. The dome has not appeared since it was last observed in [REDACTED]. The HEN EGG Radar dish was observed in different positions on three occasions during the period [REDACTED] through [REDACTED].

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In addition to the HEN EGG Radar, its control building and associated 50-foot radome, two other large buildings and four smaller buildings are located in the operations area. All of these buildings were present when the facility was first observed in [REDACTED] with the exception of the westernmost large building (Figure 21). This large building was first observed in [REDACTED].

25X1

Two probable optical tracking devices are also contained in the operations area. The easternmost structure with a 20-foot diameter dome mounted on a [REDACTED] circular pedestal was present in [REDACTED]. The second structure was first observed in [REDACTED]. No dome or equipment has ever been identified on its circular pedestal.

25X1

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Support Area

The support area (Figures 20 and 21) contains a total of 44 buildings and structures. Components of the support area include a heatplant, a power substation, a vehicle maintenance area, a water tower, an athletic field, at least ten barracks, and several other auxiliary buildings. All of the components, with the exception of six buildings and the vehicle maintenance area, were present when first observed in [REDACTED]. Four buildings were added in [REDACTED] and two smaller buildings in [REDACTED].

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25X1

TOP SECRET [REDACTED]

25X1

TOP SECRET [REDACTED]

25X1

25X1

Microwave/Calibration Facility

A microwave/calibration facility (Figure 24) is 1 nm east-northeast of Tracking Facility 3. It was first present in [REDACTED]. The facility consists of a [REDACTED] self-supporting tower with one unidentified reflector and one possible unidentified reflector. A control building is adjacent to the tower, with a small structure and a relay building directly beneath the tower. The tower is 6,280 feet from the HEN EGG Radar on an azimuth of [REDACTED].

25X1

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Interferometer

A partially constructed interferometer (Figure 25) is 3,000 feet west-southwest of the operations area. Initial construction took place between [REDACTED]. Two 1,050-foot cross-arms enclosed by a circular dirt road were graded; however, no antennas have been placed on the crossarms.

25X1

Airstrip

A natural-surface airstrip is approximately 6,000 feet east-northeast of the facility. Just north of the airstrip is a small support area containing six buildings. The strip and support areas have been present since [REDACTED]. One liaison aircraft and one probable liaison aircraft were observed immediately north of the airstrip on photography of [REDACTED].

25X1

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New Probable SA-5 SAM Launch Complex

A new probable SA-5 SAM launch complex is observed in the initial construction stage at Tracking Facility 3. The complex is approximately 11,000 feet west of the operations area and consists of three launch sites.

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Table 4. Construction Chronology at Tracking Facilities 6, 10, and 3, Sary-Shagan Antimissile Test Center

HEN EGG Radar	50-Ft Radome Opposite HEN EGG Radar	Bi-Axis Radome	Triad	Interferometer	Probable Optical Tracking Devices (Formerly called Radar "A")
Tracking Facility 6					
Observed first time. Radome in place.		Observed first time. Radome in place.		Observed first time, under construction. No arms present.	
	Observed first time. Radome in place.			Grading for arms observed first time	Two structures observed for first time with the domes probably in place
No apparent change since	No apparent change since	No apparent change since		Arms complete	
				Antennas present	
				No apparent change since	No apparent change since
Tracking Facility 10					
Circular base present; radome not in evidence. Presence of radar dish undetermined.					
Radome in place	Radome observed first time		Observed first time under construction		
Radome last observed present			Construction apparently stopped		One structure is observed for the first time. Presence of dome undetermined.
Radome removed. Radar dish present on pedestal.			Confirmed as being inactive		Presence of dome confirmed
No apparent change in status of radome or radar dish since	No apparent change since		No apparent change since		Dome removed
					No apparent change since
Tracking Facility 3					
Radome not in evidence; circular base present. Radar dish present on pedestal.	Observed first time; radome in place			Observed first time, under construction	Observed first time; only one device present. Dome in place.
Radome in place				Construction apparently ceased	
Radome last observed present					Second device present. No dome ever observed on large-scale coverage.
Radome removed. Radar dish present on pedestal					
Radome has not reappeared. Dish remains.	No apparent change since			No apparent change since	No apparent change in two devices since

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GROUND PHOTOGRAPHY

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CIA. PIC/JIR-1010/61, *Antimissile Complex, Sary-Shagan, USSR*, Apr 61 (SECRET)

CIA. [] *Instrumentation Site 2 and Selected Triad Facilities, Sary-Shagan Missile Test Center, USSR, Mar 67 (TOP SECRET)*

REQUIREMENT

CIA. C-DI5-82,750 (revised)

NPIC PROJECT

11023AV/66

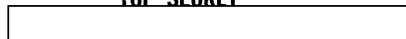
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